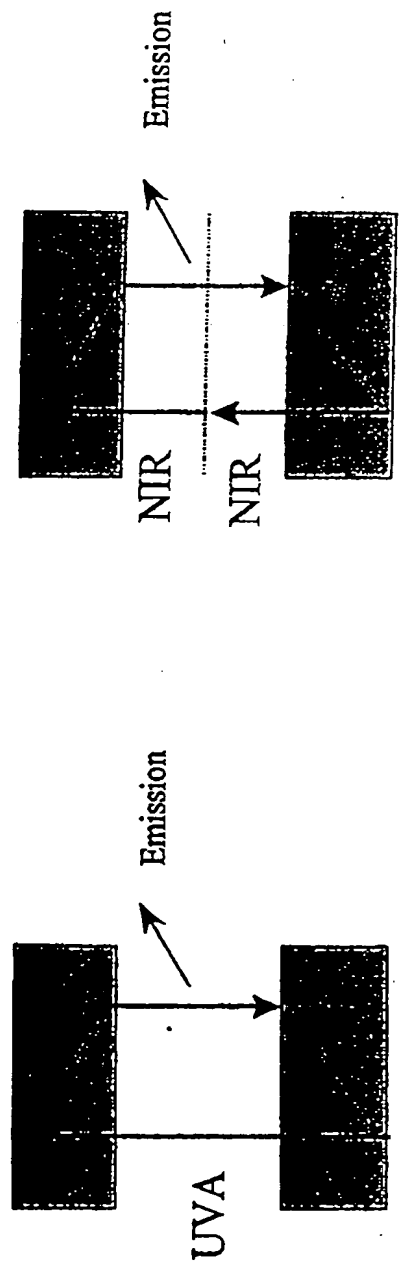


Figure 1: Schematic diagram of a photonic crystal slab waveguide structure. The structure consists of a central slab (core) and two side slabs (cladding). The core and cladding are made of a material with a refractive index n_c . The core has a thickness $2a$ and is surrounded by a cladding with a thickness $2b$. The total thickness of the structure is $2(a+b)$. The structure is illuminated by a plane wave with a wave vector k and a frequency ω . The wave is incident from the left. The wave vector k is parallel to the plane of the slabs. The frequency ω is perpendicular to the plane of the slabs. The wave is incident at an angle θ to the normal of the interface. The wave is reflected at an angle θ_r and transmitted at an angle θ_t . The wave is incident with an electric field E_i and a magnetic field H_i . The wave is reflected with an electric field E_r and a magnetic field H_r . The wave is transmitted with an electric field E_t and a magnetic field H_t . The wave is incident with a wave vector k_i and a frequency ω_i . The wave is reflected with a wave vector k_r and a frequency ω_r . The wave is transmitted with a wave vector k_t and a frequency ω_t . The wave is incident with a wave vector k_i and a frequency ω_i . The wave is reflected with a wave vector k_r and a frequency ω_r . The wave is transmitted with a wave vector k_t and a frequency ω_t .



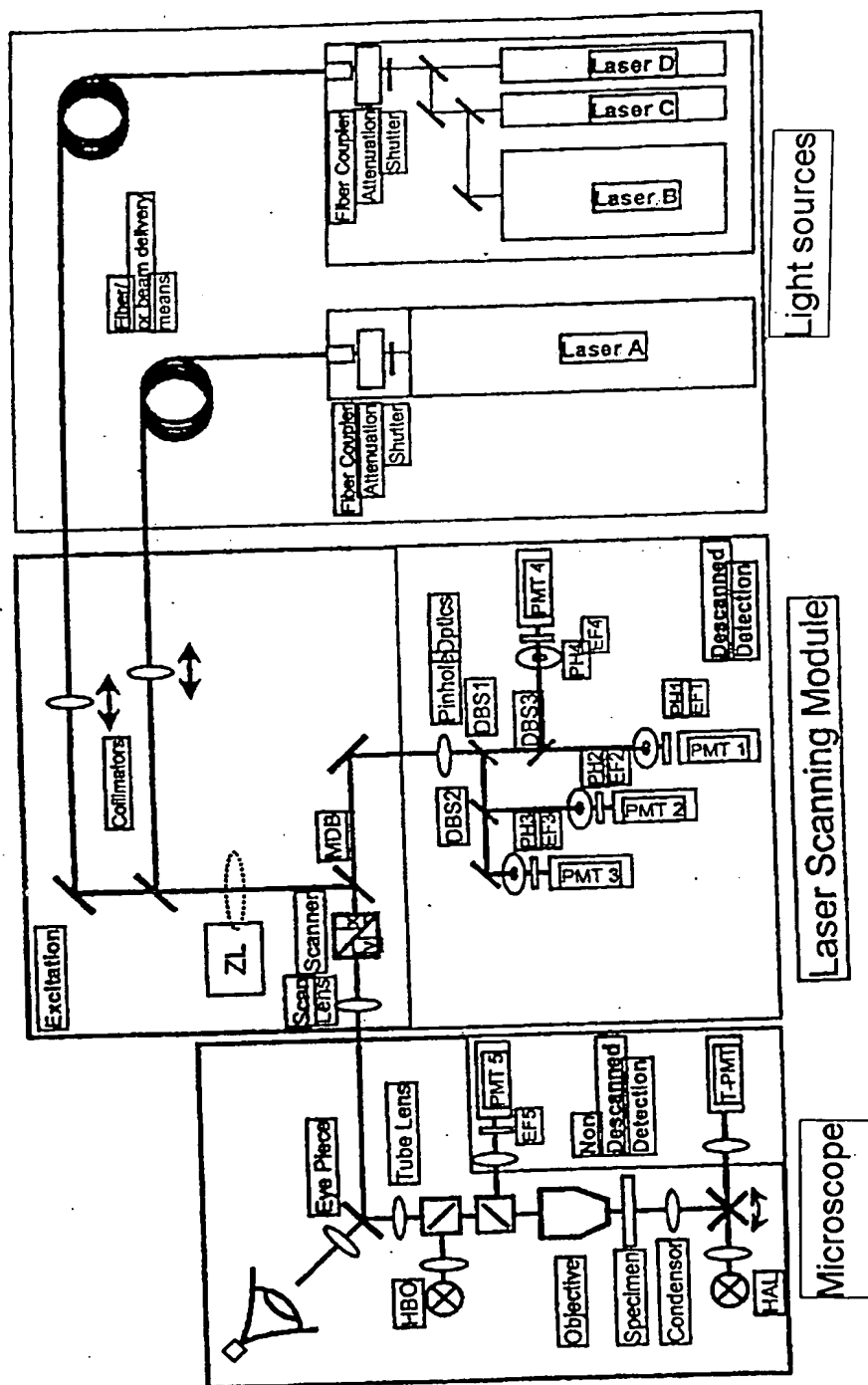
a.)

b.)

a) Single-photon absorption

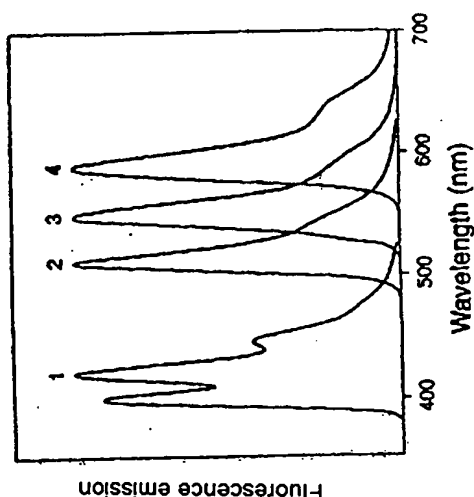
b) Multiphoton absorption

Figure 1:

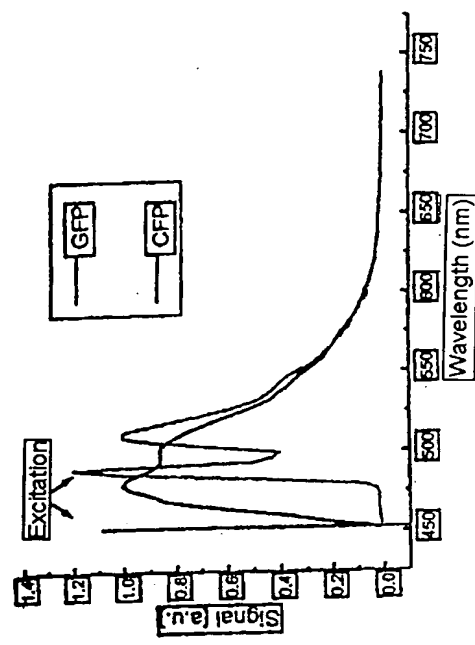


LSM construction (prior art)

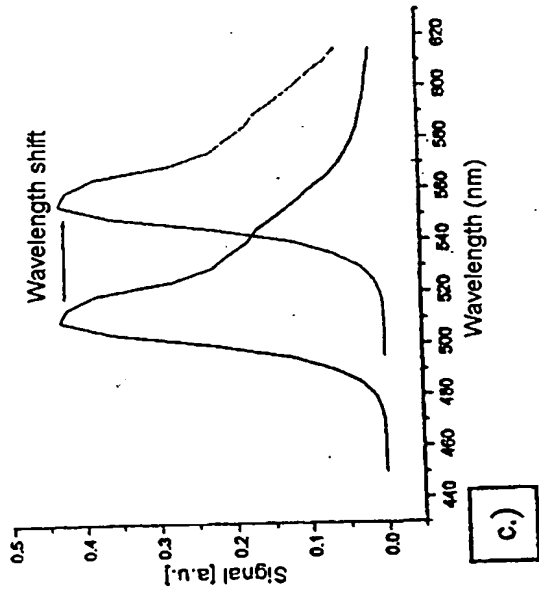
Figure: 2



a.)



b.)



c.)

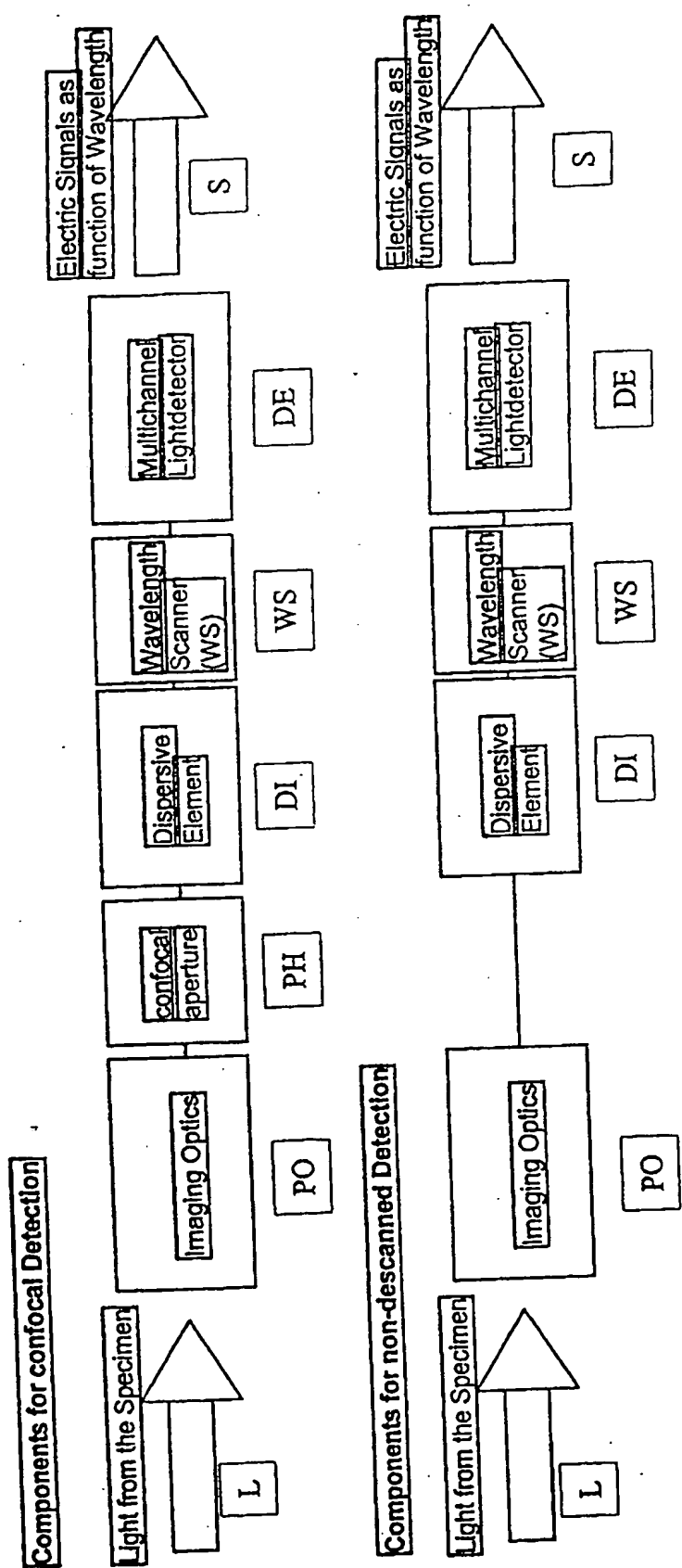
Figure: 3
Typical spectra a) Dyes, b) fluorescent proteins
c) wavelength shift as a function of environment, d) FRET

Fluorescence emission spectra of Fura Red in the presence of increasing concentrations of free Ca^{2+} . The graph shows fluorescence intensity versus wavelength (500-700 nm) for various Ca^{2+} concentrations: 0.017, 0.038, 0.065, 0.10, 0.15, 0.23, 0.35, 0.60, 1.35, and 39.8 μM . The spectra show a shift from a peak at ~540 nm to a peak at ~680 nm as Ca^{2+} concentration increases. Labels include "Ex = 488 nm", "0 μM free Ca^{2+} ", "Fura Red", "fluoro-3", and "Wavelength (nm)".

Figure: 4

Typical spectra with ratiometric measurements

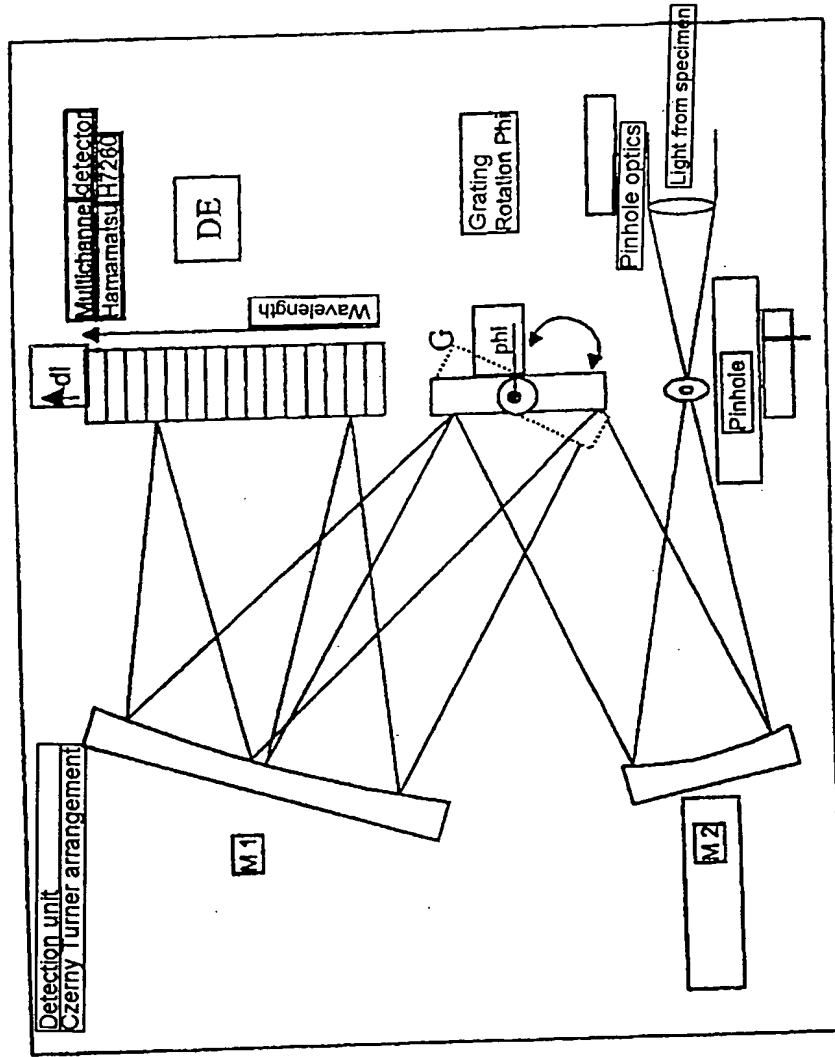
a) a dye with emission ratio; b) two dyes with ion-dependent signals



Block diagram of detector-optics construction

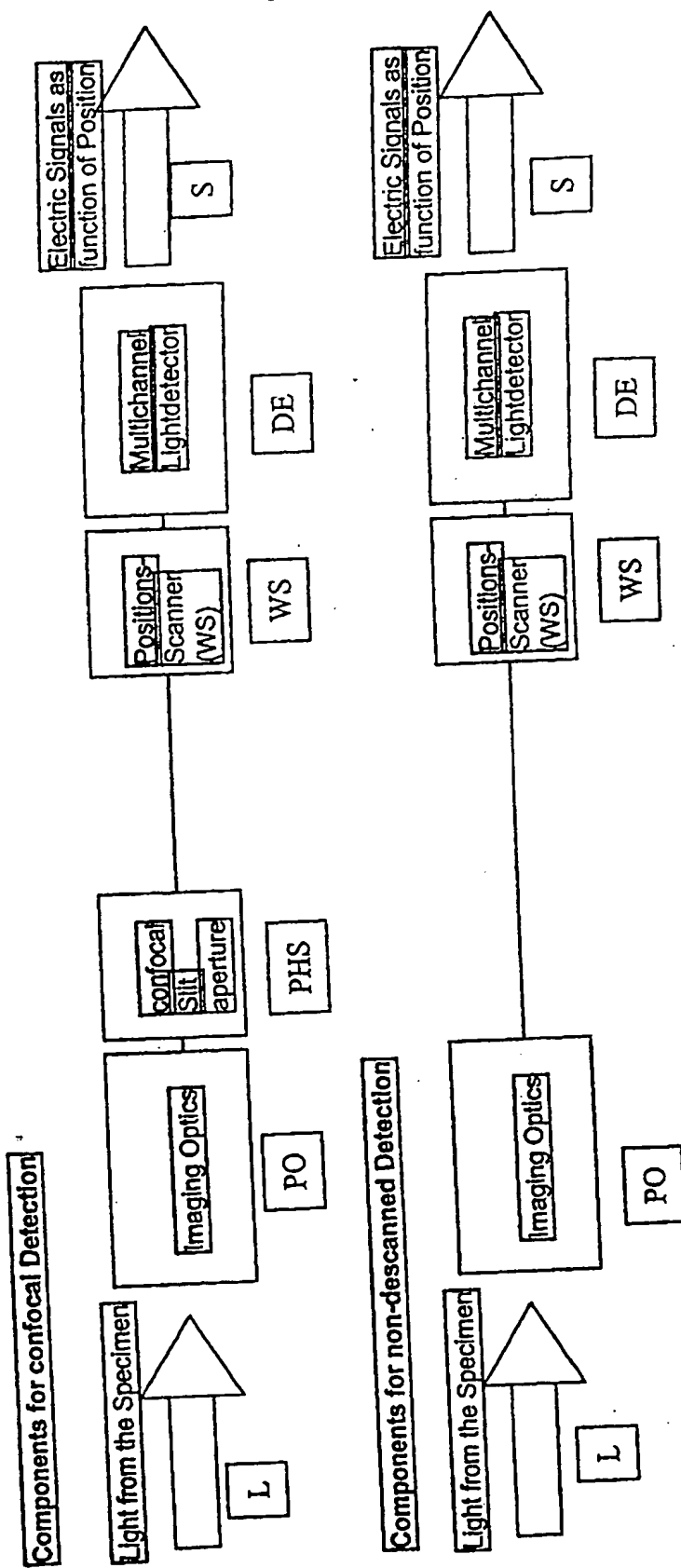
Figure: 5

Figure 6: Schematic diagram of a detector unit/optics construction. The diagram shows the optical path from a specimen through a pinhole, lenses, mirrors (M1, M2), a grating (G), and a detector (DE) to a multichannel detector (Hamamatsu H7280). The grating is rotated by a motor (phi) and the detector is rotated by a motor (psi). The detector is labeled 'WaveLength' and 'dl'.



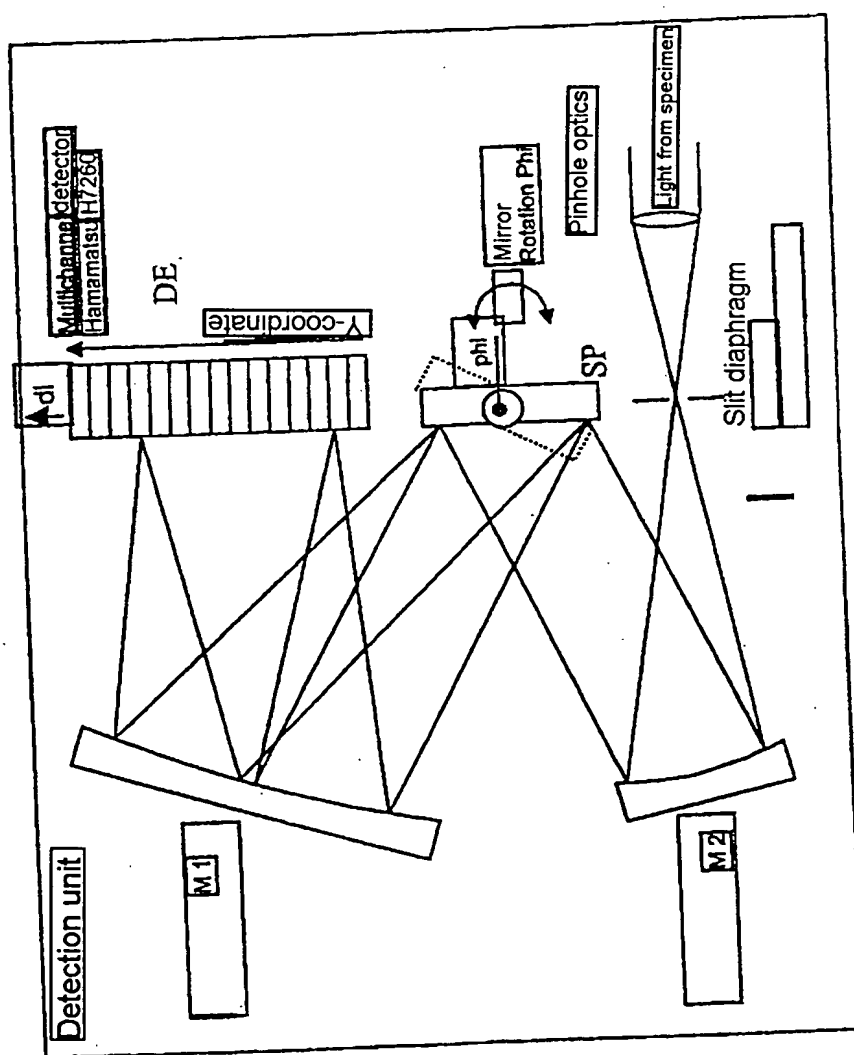
Example of detector unit/optics construction

Figure: 6



Block diagram of detector unit/optics construction for line scanner

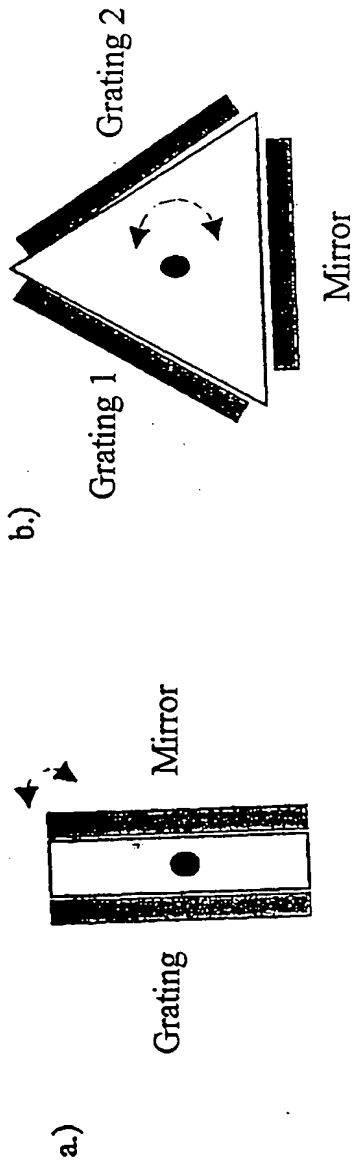
Figure: 7



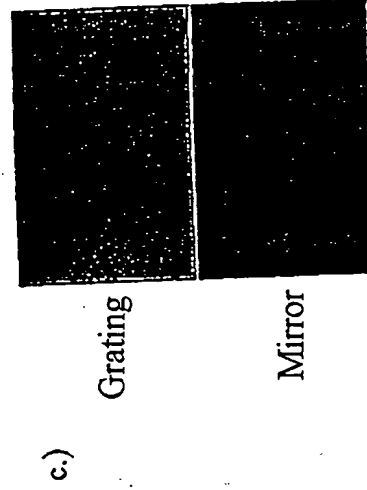
Example of detector unit/optics construction for line scanner

Figure: 8

Figure 9 shows three different switching elements. (a) is a simple grating and mirror. (b) is a more complex structure with two gratings and a mirror. (c) is a structure with a grating and a mirror, but with a different internal configuration.

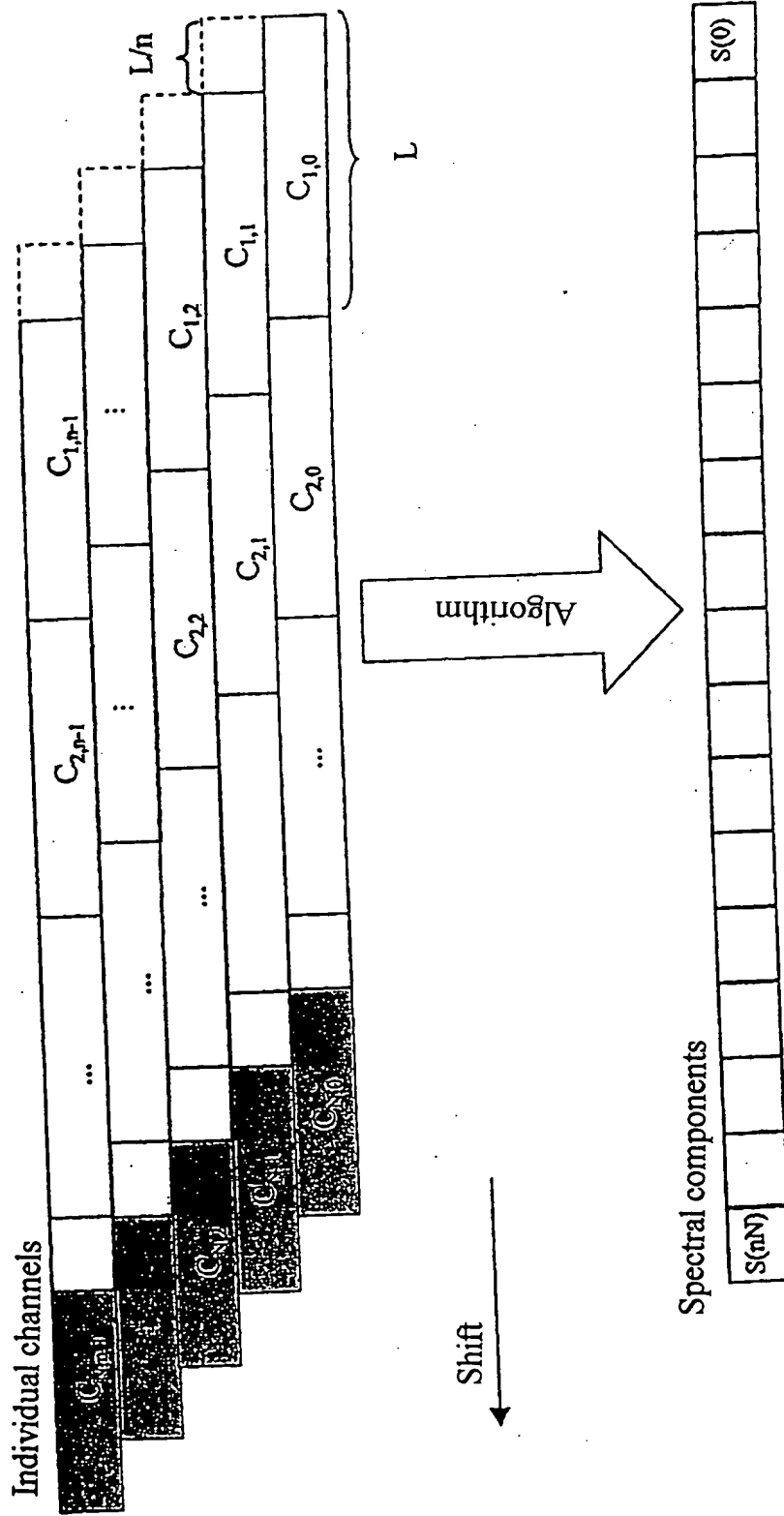


GSP



Switching elements

Figure: 9



Algorithm Pixelshift (top) and calculated sub-pixels (bottom)

Figure: 10

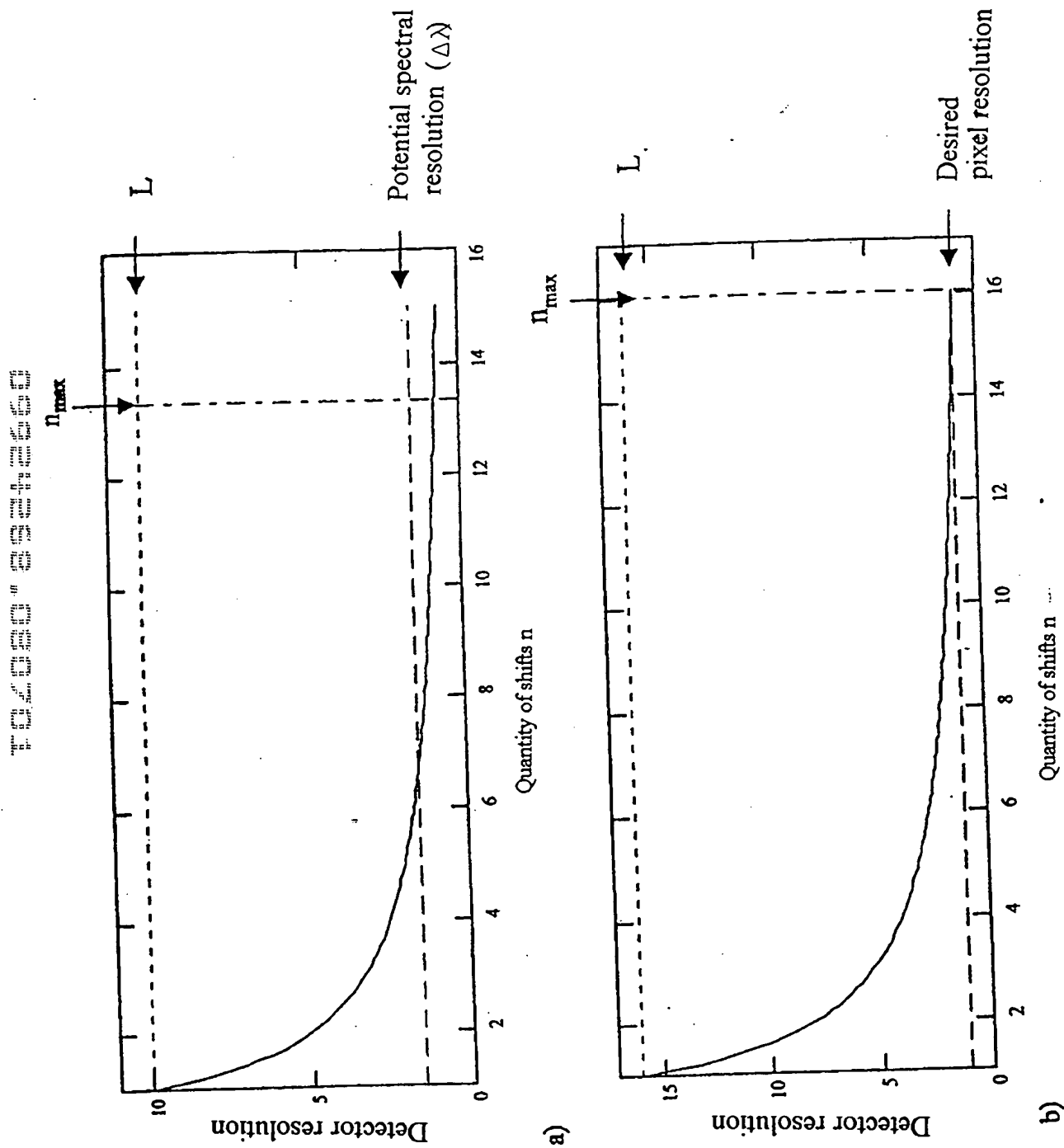
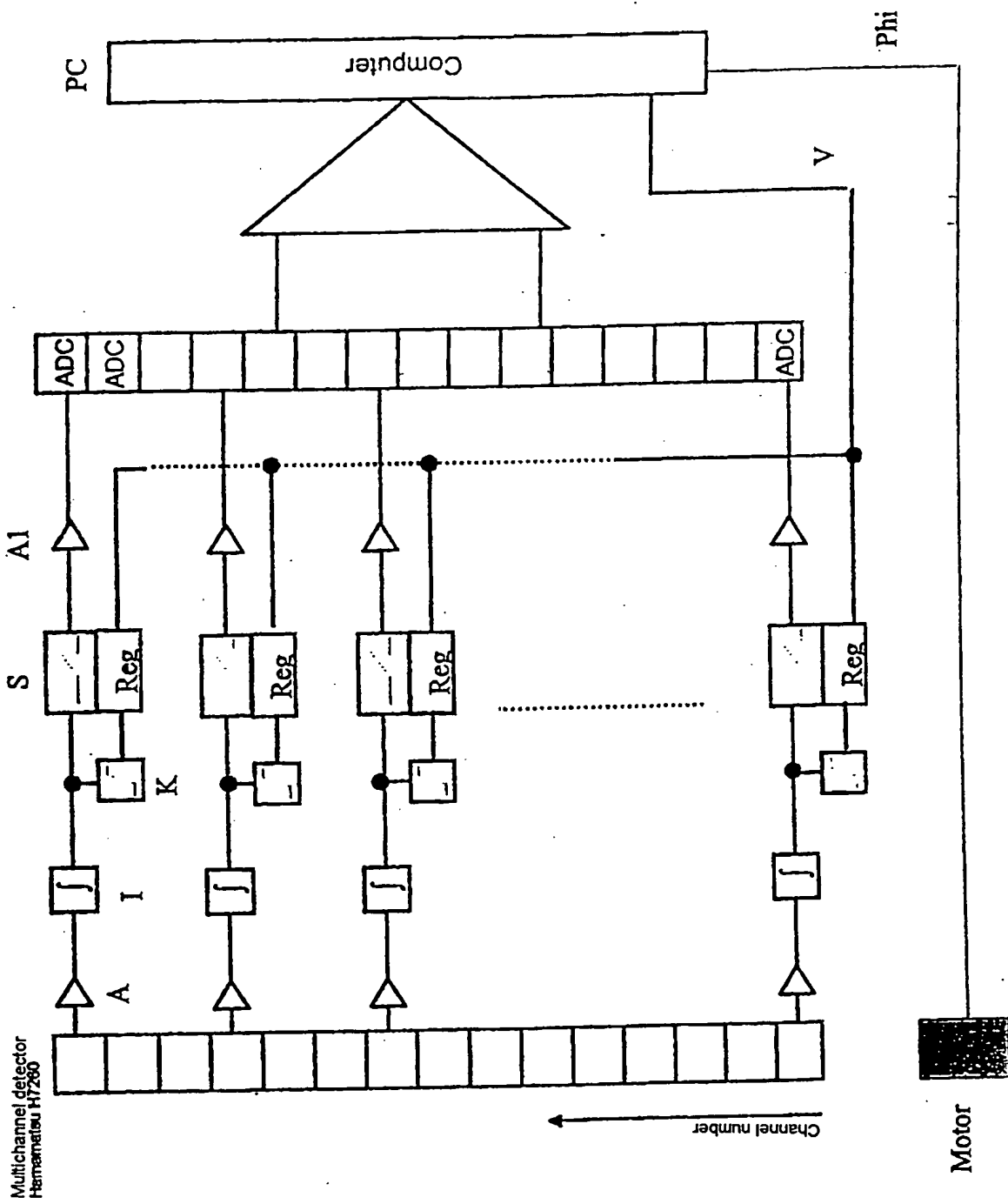


Figure: 11

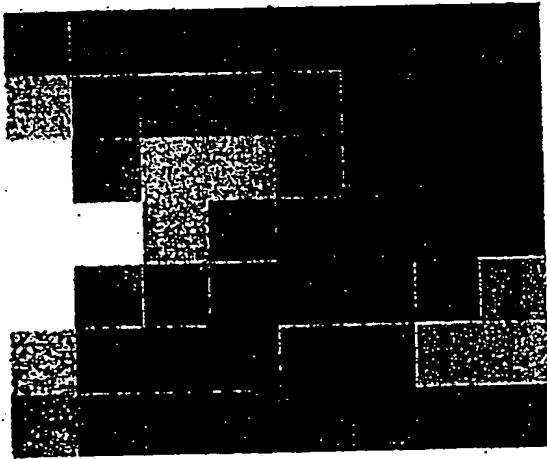


Example for construction of electronics

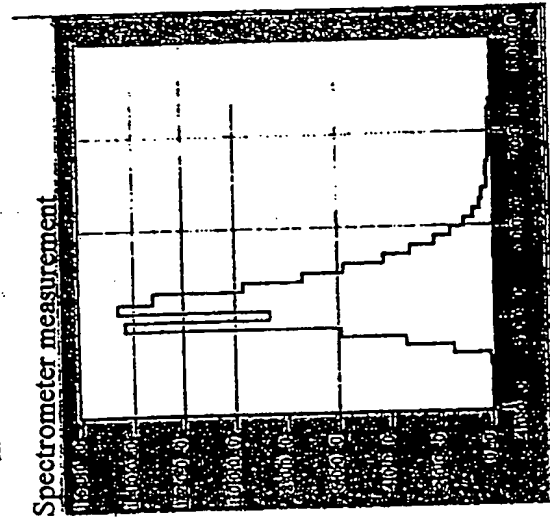
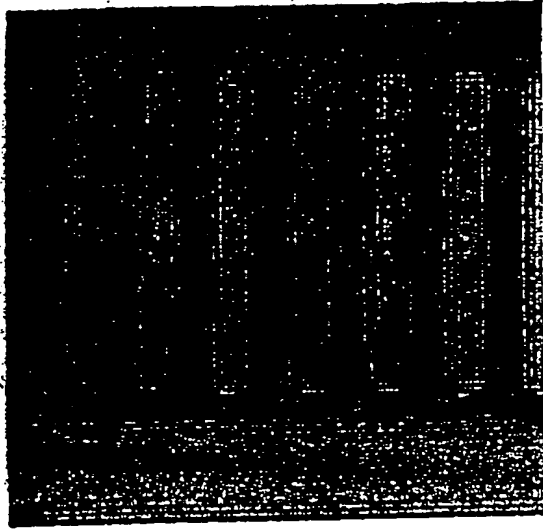
Figure: 12

1.) 2.)

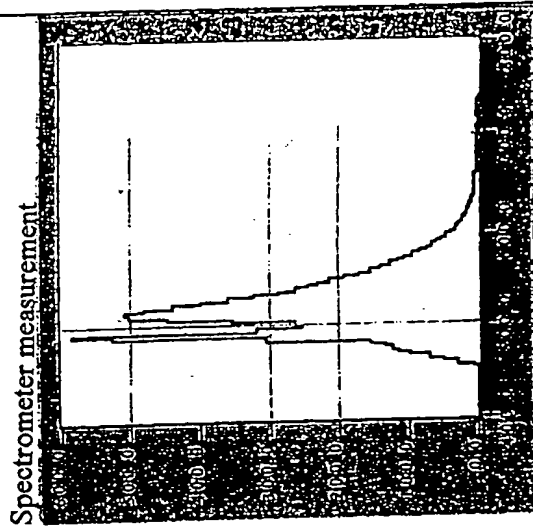
1.)



b.)



a.)



A.) Spectrum example. B.) Image example

Figure: 13